CLAIMS

We claim:

1. A system for the automatic detection and identification of hidden aboveground fixed utility objects, comprising:

at least one transponder located above ground, which is capable of being tagged to at least one utility object, for radio frequency communication with

an radio frequency (RF) scanner/receiver, for communication with

a control head; the RF scanner/receiver and control head being powered directly by a power source;

wherein,

the at least one transponder includes a radio frequency identification transponder that transmits information relating to the location of the hidden object;

the RF scanner/receiver includes at least one antenna and an RF interrogator; and

the control head includes at least one microprocessor and a user interface for automatically communicating the identification of the object; and the RF scanner/receiver and the control head are removably mounted on a mobile machine;

thereby providing the operator of the machine an adequate alert about the identity and location of the object , without requiring user interpretation when the machine comes in proximity of one of the at least one transponder and allowing the operator of the machine to avoid the at least one object tagged by the respective transponder.

2. The system of claim 1, wherein the system provides to the user approximately two seconds response time prior to physically contacting the utility object.

3. The system of claim 1, wherein the RFID operates at a frequency range of between about 13.5 MHz and 2.45 GHz.

4. The system of claim 3, wherein the RFID operates at a frequency band of approximately 915 MHz.

5. The system of claim 1, wherein the RFID outputs the GPS location of the tagged object.

6. The system of claim 1, wherein the at least one antenna is a directional antenna.

7. The system of claim 6, wherein the directional antenna is a dipole antenna.

8. The system of claim 6, wherein the directional antenna is a yagi antenna.

9. The system of claim 5, wherein the antenna is a unidirectional antenna.

10. The system of claim 1, wherein the at least one antenna includes a multiplicity of antennae.

11. The system of claim 10, wherein the antennae comprise a phased array.

12. The system of claim 11, wherein the antennae comprise directional antennae.

13. The system of claim 9, wherein the antennae comprise ranging antennae.

14. The system of claim 1, wherein the RF interrogator operates at a frequency range of between about 13.5 MHz and 2.45 GHz.

15. The system of claim 14, wherein the RF interrogator operates at a frequency band of approximately 915 MHz.

16. The system of claim 1, wherein the user interface indicates the presence of an RFID.

17. The system of claim 16, wherein the user interface further indicates the distance of the RFID.

18. The system of claim 16, wherein the user interface further indicates the direction of the RFID.

19. The system of claim 1, wherein the user interface indicates RFID selected from the group consisting of Object Types, Telephone Pedestal, Fiber Optic Junction, Water Hydrant, Gas Valve, Power Transformer, Guy Wire, Cable anchors, Power Pole, Telephone Pole, Boundary Marker, Survey Control Point , Fence, River/Stream, Metal Tower, Road/Highway, Owner, Utility Name, Emergency Phone Number, TEFIS Number, Location, Latitude, Longitude, Install Date, Absolute days since Jan 1, 1900, Last Service Date, Absolute days since Jan 1, 1900, Local References Count, Nearby reference points, Local Reference, Distance to object, Direction to object degrees, Object type code, and combinations thereof.

20. The system of claim 1, wherein the user interface provides at least one sensory alarm to alert the user when an RFID is detected.

21. The system of claim 20, wherein the at least one sensory alarm is a visual alarm.

22. The system of claim 20, wherein the at least one sensory alarm is an audible alarm.

23. The system of claim 1, wherein the user interface provides a test function.

24. The system of claim 1, wherein the user interface provides a reset control.

25. The system of claim 1, further including a GPS locator for providing the location of the machine.

26. The system of claim 25, wherein the microprocessor use the data from the GPS locator and the RFID to compute the distance and direction of the RFID from the machine.

27. The system of claim 1, further including a wireless communicator for allowing wireless communication between the system and at least one distant database.

28. The system of claim 1, wherein the control head is removably mounted on a mobile machine.

29. A method for locating, servicing, and/or troubleshooting hidden aboveground utility objects, including:

tagging the hidden utility objects with preprogrammed passive RFID transponders;

operating a vehicle for locating, servicing, and/or troubleshooting the utility object fitted with an RF transponder detection system;

decreasing the forward progress of the vehicle when an alert is observed;

locating the tagged utility object;

avoiding the tagged utility object; and

resetting the alert signal.

30. The method according to claim 38, further including the step of programming the RFID transponders at installation.

31. The method of claim 38, further including the step of wirelessly communicating with at least one distant database and automatically collecting and loading RFID information from the database.

32. The method according to claim 38, further including the step of automatically collecting and loading relative position data from surveying equipment and GPS derived information.

33. The method according to claim 38, wherein the RFID is selected from the group consisting of Object Types, Telephone Pedestal, Fiber Optic Junction, Water Hydrant, Gas Valve, Power Transformer, Guy Wire, Cable anchors, Power Pole, Telephone Pole, Boundary Marker, Survey Control Point , Fence, River/Stream, Metal Tower, Road/Highway, Owner, Utility Name, Emergency Phone Number, TEFIS Number, Location, Latitude, Longitude, Install Date, Absolute days since Jan 1, 1900, Last Service Date, Absolute days since Jan 1, 1900, Local References Count, Nearby reference points, Local Reference, Distance to object, Direction to object degrees, Object type code, and combinations thereof.

34. The method according to claim 38, further including the step of providing to the user the alert approximately two seconds prior to physically contacting the utility object.

35. The method according to claim 38, wherein the alert is at least one sensory alarm.

36. The method of claim 44, wherein the at least one sensory alarm is a visual alarm.

37. The method of claim 44, wherein the at least one sensory alarm is an audible alarm.